What is Claimed Is:

1. An imager comprising:

an electron beam generator for simultaneously irradiating an array of spots spaced apart from each other on a surface of an object to be imaged;

a detector for collecting signals resulting from the interaction of the spots with the surface of the object to form an image of the irradiated portions of the object surface; and

a movable stage for supporting the object and moving the object such that a predetermined portion of the surface of the object can be irradiated and imaged.

2. The imager of claim 1, comprising a compensator for compensating for mechanical inaccuracies in the movable stage.

3. The imager of claim 2, wherein the compensator comprises a servo for moving the spot array to compensate for the mechanical inaccuracies.

4. The imager of claim 2, wherein the compensator is selected from the group consisting of a movable mirror, an electro-optic element and an acousto-optic element for varying an angle of incidence of the light source onto the surface of the object for compensating for the mechanical inacurracies in the movable stage.

5. The imager of claim 1, wherein the electron beam generator comprises an electron source for directly irradiating the spots on the object surface.

6. The imager of claim 5, wherein the electron beam generator comprises an electron imaging column having a plurality of cathodes.

7. The imager of claim 5, wherein the electron beam generator comprises a pin-hole array for blocking an area flux of electrons from the electron source.

8. The imager of claim 5, wherein the electron source is for producing a collimated electron beam, and the electron beam generator comprises an electron blocking mask for converting the collimated electron beam into the spot array.

9. The imager of claim 1, wherein the electron beam generator comprises a projection apparatus including an electron source and an electron-optical system for generating the electron spot array from electrons furnished by the electron source.

10. The imager of claim 9, wherein the projection apparatus comprises a photocathode and an optical spot array generator.

11. The imager of claim 10, wherein the optical spot array generator comprises a micro-lens array.

12. The imager of claim 1, wherein the detector detects one of secondary and backscattered electrons from the object surface.

13. The imager of claim 12, comprising an electron optical system for generating one of a backscattered electron image and a secondary electron image from the electrons detected by the detector.

14. The imager of claim 13, wherein the electron optical system comprises an MCP and a detector array.

15. The imager of claim 14, wherein the detector array comprises a CCD.

16. The imager of claim 13, wherein the electron optical system comprises a scintillator, an image intensifier, and a CCD.

17. The imager of claim 9, wherein the projection apparatus comprises a beam-splitter.

18. The imager of claim 8, wherein the electron blocking mask comprises:

a plurality of metallic lens array membranes, each lens array membrane having an array of pinholes corresponding to the spots of the spot array, the lens array membranes being substantially parallel to each other and disposed between the electron source and the substrate such that their pinholes are concentric; and

a voltage source connected to each lens array membrane for supplying a different voltage to each lens array membrane.

19. The imager of claim 18, wherein each lens array membrane has pinholes of a different diameter than the pinholes of the other lens array membranes.

20. The imager of claim 18, further comprising an aperture membrane comprising an array of pinholes corresponding to the pinholes of the lens array membranes, the aperture membrane disposed between the electron source and the plurality of lens array membranes.

21. The imager of claim 1, wherein the movable stage is for moving the object substantially linearly in a scanning direction that deviates from an axis of the spot array such that as the object is moved a distance substantially equal to a length of the spot array in the scanning direction, the spots trace a substantially continuous path on the object surface in a mechanical cross-scan direction.

22. The imager of claim 21, wherein the movable stage is for moving the object such that the spots overlap as they trace the continuous path on the object surface.

23. The imager of claim 22, wherein the movable stage is for moving the object such that the spots are interleaved as they trace the continuous path on the object surface.

24. The imager of claim 22, wherein the spot array comprises a plurality of rows and columns of spots, and the electron beam generator is for irradiating a predetermined number of rows of spots such that the spots of two adjacent ones of the columns overlap as they trace the continuous path on the object surface.

25. The imager of claim 1, wherein the electron beam generator is for irradiating a first path between the electron beam generator and the surface of the object, and the detector is for collecting the signals from the surface of the object along a second path different from the first path.

26. The imager of claim 24, wherein the electron beam generator is for irradiating additional rows of spots, such that a total number of rows of spots is greater than the predetermined number of rows of spots, and the two adjacent ones of the columns overlap.

27. The imager of claim 26, wherein the electron beam generator is for irradiating a sufficient number of the additional rows of spots such that neighboring pixels used for an image processing algorithm are all from one of the columns.

28. An inspection system comprising:

a first electron beam generator for irradiating a first array of spots spaced apart from each other on a surface of a first object to be imaged;

a second electron beam generator for irradiating a second array of spots spaced apart from each other on a surface of a second object to be imaged, wherein the first and second

spot arrays are substantially identical, and the surfaces of the first and second objects correspond to each other;

a first detector array for collecting signals resulting from the interaction of the spots with the surface of the first object to form an image of the irradiated portions of the first object surface;

a second detector array for collecting signals resulting from the interaction of the spots with the surface of the second object to form an image of the irradiated portions of the second object surface;

a movable stage for supporting the first and second objects and moving the objects such that substantially the entire surface of each object can be irradiated and imaged; and

a processor for comparing the images of the first and second objects.

29. The inspection system of claim 28, wherein the processor is configured to determine whether a defect exists in the surface of the second object based on the comparison of the images of the first and second objects.

30. The inspection system of claim 29, wherein the processor is configured to determine that a defect exists in the surface of the second object when a value of a parameter of the image of the second object surface differs from a value of the parameter of the image of the first object surface by more than a predetermined threshold amount.

31. The imager of claim 28, further comprising a compensator for compensating for mechanical inaccuracies in the movable stage.

32. A method comprising the steps of:

directing electrons to simultaneously irradiate an array of spots spaced apart from each other on a surface of an object to be imaged;

collecting signals resulting from the interaction of the spots with the surface of the object to form an image of the irradiated portions of the object surface; and

moving the object on a movable stage while the irradiating and collecting steps are being performed, such that a predetermined portion of the surface of the object can be irradiated and imaged.

33. The method of claim 32, comprising moving the object substantially linearly in a scanning direction that deviates from an axis of the spot array such that as the object is moved a distance substantially equal to a length of the spot array in the scanning direction, the spots trace a substantially continuous path on the object surface in a mechanical cross-scan direction.

34. The method of claim 33, comprising moving the object such that the spots overlap as the trace the continuous path on the object surface.

35. The method of claim 34, comprising moving the object such that the spots are interleaved as they trace the continuous path on the object surface.

36. The method of claim 34, wherein the spot array comprises a plurality of rows and columns of spots, comprising irradiating a predetermined number of rows of spots such that the spots of two adjacent ones of the columns overlap as they trace the continuous path on the object surface.

37. The method of claim 36, wherein the plurality of rows and columns of spots corresponds to an area of a portion of the surface of the object, the method comprising irradiating additional rows of spots, such that a total number of rows of spots is greater than the predetermined number of rows of spots, and the two adjacent ones of the columns overlap.

38. A method comprising:

directing electrons to simultaneously irradiate a first array of spots spaced apart from each other on a surface of a first object to be imaged;

directing electrons to simultaneously irradiate a second array of spots spaced apart from each other on a surface of a second object to be imaged, wherein the first and second spot arrays are substantially identical, and the surfaces of the first and second objects correspond to each other;

collecting signals resulting from the interaction of the spots with the surface of the first object to form an image of the irradiated portions of the first object surface;

collecting signals resulting from the interaction of the spots with the surface of the second object to form an image of the irradiated portions of the second object surface;

moving the first and second objects on a movable stage such that a predetermined portion of the surface of each object can be irradiated and imaged; and

comparing the images of the first and second objects.

39. The method of claim 38, comprising determining whether a defect exists in the surface of the second object based on the comparison of the images of the first and second objects.

40. The method of claim 39, comprising determining that a defect exists in the surface of the second object when a value of a parameter of the image of the second object surface differs from a value of the parameter of the image of the first object surface by more than a predetermined threshold amount.

41. The method of claim 38, wherein the first and second objects are subject to substantially identical mechanical vibrations during the moving step.

42. The method of claim 38, comprising compensating for mechanical inaccuracies in the moving stage.

43. The imager of claim 21, wherein the movable stage is for moving the object from a first position to a second position in the scanning direction such that the spots on the object surface at the second position are offset from an axis of the scanning direction and from the mechanical cross-scan direction relative to the first position.

44. The imager of claim 1, wherein a first portion of the signals resulting from the interaction of the spots with the surface of the object are emitted from the surface at a first angle and collected by the detector, and a second portion of the signals are emitted from the surface at a second angle different from the first angle, the imager further comprising a second detector for collecting the second portion of the signals.